

INFORMATION
ONLY

ROCKY FLATS ENVIRONMENTAL
TECHNOLOGY SITE

EMD OPERATING
PROCEDURES MANUAL
VOL I: FIELD OPERATIONS

Manual No.: 5-21000-OPS-FO
New Manual No.: 4-11000-ER-OPS-FO
Procedure No.: Table of Contents, Rev 77
Page: 1 of 3
Effective Date: 12/02/94
Organization: Environmental Management

THIS IS ONE VOLUME OF A SIX VOLUME SET WHICH INCLUDES:

VOLUME I: FIELD OPERATIONS (FO)
VOLUME II: GROUNDWATER (GW)
VOLUME III: GEOTECHNICAL (GT)
VOLUME IV: SURFACE WATER (SW)
VOLUME V: ECOLOGY (EE)
VOLUME VI: AIR (AP)

TABLE OF CONTENTS FOR VOLUME I: FIELD OPERATIONS

Procedure No.	Title	Rev. No.	Effective Date
FO.01	Air Monitoring and Dust Control	2	05/12/92
FO.02	94-DMR--000563 - Cancellation of FO.02 Transmittal of QA Records	3	04/15/94
FO.03	General Equipment Decontamination	2	05/12/92
94-DMR-001021	Section FO.03 Text Addition	2	05/26/94
94-DMR-001010	LIMITED SCOPE - Section FO.03 Text Modification	2	06/01/94
94-DMR-001224	Equipment Decontamination Location Adjustment	2	07/15/94
FO.04	Heavy Equipment Decontamination	2	05/12/92
94-DMR-001009	LIMITED SCOPE - Section FO.04 Text Modification	2	06/01/94
FO.05	Handling of Purge and Development Water	2	05/12/92
94-DMR-000278	Groundwater Monitoring Modifications	2	02/25/94
FO.06	Handling of Personal Protective Equipment	2	05/12/92
FO.07	Handling of Decontamination Water and Wash Water	2	05/12/92
94-DMR-001175	LIMITED SCOPE - Decontamination Water Disposal Location Changes	2	06/20/94
FO.08	Handling of Drilling Fluids and Cuttings	2	05/12/92
94-DMR-001650	Procedural Clarifications	2	09/27/94

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 Page: 2 of 3
 Effective Date: 12/02/94
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<u>Procedure No.</u>	<u>Title</u>	<u>Rev. No.</u>	<u>Effective Date</u>
FO.09	Handling of Residual Samples	2	05/12/92
FO.10	Receiving, Labeling, and Handling Environmental Materials Containers	2	05/12/92
93-DMR-000677	DMR	2	11/01/93
94-DMR-000244	Drying Agent Modification	2	03/14/94
94-DMR-000558	Form Modification	2	04/15/94
94-DMR-001649	Deletion of Text Addressed in FO.08	2	09/27/94
FO.11	Field Communications	2	05/12/92
FO.12	Decontamination Facility Operations	2	05/12/92
FO.13	Containerization, Preserving, Handling and Shipping of Soil and Water Samples	2	05/12/92
93-DMR-000530	Section FO.13 Modification	2	11/04/93
93-DMR-000667	Section FO.13 Modification	2	11/20/93
94-DMR-000143	Composite Sampling Clarification	2	02/11/94
94-DMR-001670	New Statement of Work	2	09/15/94
FO.14	4-B29-ER-OPS-FO.14 - Field Data Management	3	09/09/94
FO.15	Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs)	2	05/12/92
FO.16	Field Radiological Measurements	2	05/12/92
FO.18	Environmental Sample Radioactivity Content Screening	1	05/12/92
FO.19	Base Laboratory Work	2	05/12/92
FO. 23	4-F99-OPS-FO.23 - Management of Soil and Sediment Investigative Derived Materials (IDM)	0	01/11/94
94-DMR-000137	Training Requirements Clarification	0	01/28/94
94-DMR-000148	Section FO.23 Modifications	0	02/09/94
94-DMR-001108	Buried Instrumentation and Existing Soil	0	06/14/94
94-DMR-001350	Various Text Additions and Deletions Regarding Drums and Use of SOP FO.29	0	08/16/94

INFORMATION ONLY

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

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Manual No.: 5-21000-OPS-FO
 New Manual No.: 4-11000-ER-OPS-FO
 Procedure No.: Table of Contents, Rev 77
 Page: 3 of 3
 Effective Date: 12/02/94
 Organization: Environmental Management

<u>Procedure No.</u>	<u>Title</u>	<u>Rev. No.</u>	<u>Effective Date</u>
FO.25	4-B11-ER-OPS-FO.25 - Shipment of Radioactive Materials Samples	0	12/01/93
FO.27	4-BO1-ER-OPS-FO.27 - Collection of Floor/Equipment Hot Water Rinsate Samples	0	07/26/93
FO.29	4-H46-ENV-OPS-FO.29 - Disposition of Soil and Sediment Investigation-Derived Materials	0	06/24/94
94-DMR-001226	Allowance of Procedural Use for Waste Piles	0	07/15/94
94-DMR-001741	Permission of Use of Computer-Generated Forms and Other Minor Corrections	0	10/07/94
FO.30	4-I11-ER-OPS-FO.30 - Environmental Restoration Program Division Equipment Operation	0	10/07/94
FO.31	4-I49-ENV-OPS-FO.31 - Groundwater Recovery/Storage System - Normal Operations OU1, Bldg 891	0	11/23/94
FO.32	4-I50-ENV-OPS-FO.32 - Treated Effluent Discharge OU1, Bldg 891	0	04/13/94
FO.34	4-I52-ENV-OPS-FO.34 - Ion Exchange System - Normal Operations OU1, Bldg 891	0	11/23/94
FO.35	4-I53-ENV-OPS-FO.35 - Ultraviolet/Hydrogen Peroxide Oxidation System - Normal Operations OU1, Bldg 891	0	11/15/94
FO.37	4-I55-ENV-OPS-FO.37 - Neutralization Tank - Normal Operations OU1, Bldg 891	0	11/23/94
•FO.38	4-I56-ENV-OPS-FO.38 - Bulk Chemical Handling, Transfer, and Storage, OU1, Bldg 891	0	12/02/94
•FO.39	4-I57-ENV-OPS-FO.39 - Calibration, Operation, and Maintenance of Monitoring and Fluid Handling Equipment OU1, Bldg 891	0	12/02/94

Rocky Flats Environmental Technology Site INFORMATION ONLY

4-I57-ENV-OPS-FO.39

REVISION 0

CALIBRATION, OPERATION, AND MAINTENANCE OF MONITORING AND FLUID HANDLING EQUIPMENT OPERABLE UNIT 1, BUILDING 891

APPROVED BY: *S.G. Stiger* *S.G. Stiger* *1 10-26-94*
 Director, Print Name Date
 EG&G Environmental Restoration Program Division

[Signature] *G. LUKER* *1 10-26-94*
 Quality Assurance Program Manager, Print Name Date
 Data Management and Reporting Services

DOE RFFO/ER Concurrence on file: ☐ Yes ☐ No ☒ NAEnvironmental Protection Agency Approval Received: ☐ Yes ☒ No NOT REQUIREDResponsible Organization: Environmental Restoration Program Division Effective Date: *12-02-94* *lme*

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Environmental Operations Support
 Geosciences
 OU-1 Closure
 Sample Management
 Industrial Hygiene
 Occupational Safety
 Radiological Health and Engineering
 Surface Water Division

USE CATEGORY 3

ORC review not required

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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
TITLE PAGE	1
LIST OF EFFECTIVE PAGES	2
TABLE OF CONTENTS	3
1. PURPOSE	4
2. SCOPE	4
3. OVERVIEW	4
4. RESPONSIBILITIES	4
5. LIMITATIONS AND PRECAUTIONS	4
6. PREREQUISITES	5
6.1 Planning and Coordination	5
6.2 Measuring and Test Equipment	5
6.3 Consumables	5
7. INSTRUCTIONS—INSTRUMENT CALIBRATION	6
7.1 pH Probe Calibration	6
7.2 Conductivity Sensor Calibration	9
8. INSTRUCTIONS—QUARTZ TUBE CLEANING	11
9. RECORDS	13
10. REFERENCES	14
Appendixes	
Appendix 1, Valves	15
Appendix 2, Form FO.8B	21

1. PURPOSE

This procedure describes the normal calibration and maintenance operations steps required during operation of the Building 891 Groundwater Treatment Facility for 881 Hillside, Operable Unit 1.

2. SCOPE

This procedure applies to all Environmental Operations Management employees and subcontractors.

This procedure addresses:

- Instrument calibration.
- Quartz tube cleaning.

3. OVERVIEW

This procedure contains instructions for routine maintenance which is required during operation of the Building 891 Groundwater Treatment Facility. Non-routine maintenance is performed in accordance with instructions in :

- The vendor maintenance manuals maintained at the Building 891 Groundwater Treatment Facility.
- EG&G maintenance requirements.

The Building 891 Groundwater Treatment Facility consists of a groundwater recovery and storage system, an ultraviolet/hydrogen peroxide (UV/H₂O₂) oxidation system, an ion exchange (IX) system with units for acid and caustic regeneration of resin, a spent regenerant neutralization system, and a treated effluent storage and discharge system. System valve designators, nomenclature, and types are shown in Appendix 1, Valves.

4. RESPONSIBILITIES

4.1 Operator

Calibrates the pH probe and the IX system conductivity sensors.

Cleans the quartz tubes.

4.2 Project Manager

Ensures that project personnel are properly trained and documents the training.

5. LIMITATIONS AND PRECAUTIONS

- The maintenance instructions in this procedure shall be performed on a routine basis to ensure adequate treatment of the groundwater before discharge to the South Interceptor Ditch.

5. **LIMITATIONS AND PRECAUTIONS (continued)**

- The cleaning of the quartz tubes may expose the Operator to high temperatures or flooding. Lockout/Tagout of the UV/H₂O₂ will ensure Operator safety.
- During organic vapor monitoring procedures, if any reading is above background all personnel shall stop work immediately, leave the area, and notify project manager.

6. **PREREQUISITES**

6.1 **Planning and Coordination**

Project Manager

- [1] Ensure that all personnel involved in implementing this procedure have the appropriate health and safety training as specified in the Rocky Flats Plant Operable Unit 1 Groundwater Treatment Facility Health and Safety Plan.
- [2] Document personnel qualifications related to this procedure in the project files in accordance with 3-21000-ADM-02.01, Training.

Operator

- [3] Calibrate HNu meter for organic vapor monitoring in accordance with 5-21000-FO.15, Use of Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs), Appendix B.

6.2 **Measuring and Test Equipment**

Operator

- [1] Ensure that the following calibrated instruments are available for use:
 - HNu meter
 - Thermometer with range including 40 to 100°F

6.3 **Consumables**

Operator

- [1] Ensure sufficient quantities of the following solutions are on hand:
 - Calibration buffer solution, pH 7.0
 - Calibration buffer solution, pH 4.0
 - Calibration buffer solution, pH 10.0
 - Calibration conductivity solution 900 nanosiemens
 - Calibration conductivity solution 1045 nanosiemens
 - Calibration conductivity solution 11 nanosiemens
 - Calibration gas, Isobutylene 100 ppm

7. INSTRUCTIONS—INSTRUMENT CALIBRATION

Project Manager and Operator

- [1] Document all activities on the Daily Log in accordance with 2-G18-ER-ADM-17.01, Records Capture and Transmittal.

Project Manager

- [2] Verify that all prerequisites in Section 6, Prerequisites have been completed, and record on Daily Log.

7.1 pH Probe Calibration

CAUTION

Calibration of the probes is only performed when the IX system is shut down to prevent damage to the IX system pH probes.

Operator

- [1] Place one of the toggle switches inside the I/O panel in MANUAL.
 - IX-2 pH Controller
 - IX-3 pH Controller
 - IX-4 pH Controller

This allows for input for calibration without activating automatic functions controlled by the pH controllers.

- [2] Perform one of the following actions to isolate the appropriate probe:
 - For IX-2, close V-130, IX-2 Effluent Isolation, and V-8, Degasifier Inlet Isolation.
 - For IX-3, close V-131, IX-4 Effluent Isolation, and V-94, IX-4 Effluent.
 - For IX-4, close V-12, IX-3 Outlet Isolation, and V-13, IX-4 Inlet Isolation.
- [3] Don proper PPE in accordance with the requirements of the Health and Safety Plan.
- [4] Loosen and remove the pH probe.
- [5] Place the pipe plug in the fitting where the pH probe was removed.
- [6] Place the probe in a container of 7.0 pH calibration buffer solution, and allow the probe to stabilize at room temperature for approximately 10 minutes.
- [7] Measure the temperature of the calibration buffer solution with a thermometer of known accuracy, and compare the temperature with the temperature reading on the pH controller in the Motor Control Room.

7.1 pH Probe Calibration (continued)

Operator (continued)

- [8] **IF** the temperature indicated on the pH controller does **NOT** match the temperature of the thermometer within plus or minus 1° C,
THEN adjust the controller by pressing the CALIB button until temp/CAL appears on the screen.
- [9] Press the ADJ/ENABLE button, and use the arrow keys to enter the thermometer reading.

A temperature of 25° C appears as 025.
- [10] Press the ACK/ENTER button.

The controller reverts to the pH display mode.
- [11] Press the TEMP button, and compare the reading with the temperature indicated on the thermometer.
- [12] **IF** the reading is **NOT** within plus or minus 1° C,
THEN repeat Steps [7] and [8] until the readings of the thermometer and controller match to within plus or minus 1° C.
- [13] Press the mV keypad while the pH probe is immersed in the 7.0 pH buffer solution.
- [14] Verify that the display reads 000 mV (-012 mV to 012 mV).
- [15] Press the CALIB button.

This causes the STD button and the default set number to flash.
- [16] Press the ADJ/ENABLE button, and use the arrow keys to display 07.0.
- [17] Press the ACK/ENTER button to enter the data into the controller memory.

The unit automatically reverts to the pH display.
- [18] **IF** the reading is **NOT** 7.0 (6.98 to 7.02),
THEN repeat the following Steps [12] and [14] through [16] until the display is 7.0 (6.98 to 7.02).
- [19] Rinse the pH probe with deionized water, and place the probe in a container with 4.0 pH calibration buffer solution.
- [20] Allow the probe to stabilize for 5 minutes.

7.1 pH Probe Calibration (continued)

Operator (continued)

- [21] Press the mV keypad while the probe is immersed in the 4.0 pH calibration buffer solution.
- [22] Verify that the display reads 177 (165 to 189 mV).
- [23] Press the CALIB button twice.

SLP flashes on the display alternately with the default set number.
- [24] Press the ADJ/ENABLE button, and use the arrow keys to adjust the display to 04.0.
- [25] Press the ACK/ENTER button to enter the data into the controller memory.
- [26] Verify that the controller reverts to the pH display mode, and reads 4.00 (3.99 to 4.01).
- [27] Remove the pipe plug, and install the pH probe in the proper location.
- [28] Perform one of the following to restore the system to normal:
 - For IX-2, open valves V-130 and V-8.
 - For IX-3, open valves V-131 and V-94.
 - For IX-4, open valves V-12 and V-13.
- [29] **WHEN** the IX system is returned to service,
THEN monitor the pH probe for leaks.
- [30] Place the appropriate pH Controller toggle switch inside the I/O panel in AUTO.
- [31] Document calibration activities on the Daily Log, including solutions used and as left values.

7.2 Conductivity Sensor Calibration

CAUTION

Calibration of the IX system conductivity sensors is only performed when the IX system is shut down to prevent damage to the sensors.

Operator

- [1] Perform one of the following actions to Isolate the appropriate conductivity sensor:
 - For IX-2, close V-130, IX-2 Effluent Isolation, and V-8, Degasifier Inlet Isolation.
 - For IX-3, close V-131, IX-4 Effluent Isolation, and V-94, IX-4 Effluent.
 - For IX-4, close V-12, IX-3 Outlet Isolation, and V-13, IX-4 Inlet Isolation.

- [2] Don proper PPE in accordance with the requirements of the Health and Safety Plan.

- [3] Loosen and remove the conductivity sensor.

- [4] Place the pipe plug in the fitting where the conductivity sensor was removed.

NOTE *The container needs enough conductivity solution to completely cover the electrode, and needs to be large enough to prevent the conductivity sensor from touching the sides of the container.*

- [5] Place the conductivity sensor in a known conductivity solution equal to approximately 10% of the scale.

- [6] Stir the conductivity sensor in the solution to eliminate any air bubbles that may cling to the electrodes.

- [7] Adjust the offset potentiometer on the back of the controller inside the rear panel until the controller indicates the proper display value.

The offset potentiometer is the third screw from the left in a series of four screws at the top of the controller just beneath the sensor wiring.

- [8] Remove the conductivity sensor from the solution, and rinse thoroughly in distilled water.

- [9] Place the conductivity sensor in a beaker of known conductivity solution equal to approximately 90% of the scale.

NOTE *The offset and gain potentiometers are interactive.*

- [10] Adjust the gain potentiometer immediately to the right of the offset potentiometer until the controller indicates the proper display value.

7.2 Conductivity Sensor Calibration (continued)

Operator (continued)

[11] Repeat Steps [4] through [9] until the readings are stable:

[12] **IF** a stable reading **CANNOT** be attained,
THEN reset the temperature coefficient:

[A] Press the CALIB button twice.

[B] Verify that the display flashes OUTPUT and TC.

[C] Press the ADJ/ENABLE button.

The display stops flashing, except for the last digit.

[13] Press the up or down arrow to change the flashing digit.

[14] Press the < button to advance the flashing digit to the next position.

[15] Press the up or down arrow to change the flashing digit.

[16] Press the ENTER button when the display is correct.

The display returns to the normal mode, indicating conductivity value.

[17] Remove the pipe plug, and install the conductivity sensor in the proper location.

[18] Perform one of the following actions to restore the system to normal:

- For IX-2, open V-130 and V-8.
- For IX-3, open V-131 and V-94.
- For IX-4, open V-12 and V-13.

[19] **WHEN** the IX system is returned to service,
THEN monitor the conductivity sensor for leaks.

[20] Record calibration activities on the Daily Log, including solutions used and as-left values.

8. INSTRUCTIONS—QUARTZ TUBE CLEANING

Project Manager and Operator

- [1] Document all activities on the Daily Log in accordance with 2-G18-ER-ADM-17.01, Records Capture and Transmittal.

Project Manager

- [2] Verify that all prerequisites in Section 6, Prerequisites have been completed, and record on Daily Log.

Operator

- [3] Ensure that the UV/H₂O₂ unit power is turned OFF at the control panel on the east side of the unit.

The power switch is spring loaded and returns to the vertical position when released.

- [4] Disconnect Breakers PDP UCP 2-2 PWR DISTRIB PNL (UV-PC-2) and PDP UCP 2-1 PWR DISTRIB PNL (UV-PC-1).

Breakers are located on wall east of UV Main Control Panel.

- [5] Close HVB-201, Effluent from T-201 and HVB-202, Effluent from T-202.
- [6] Close FCV-4, UV Effluent Control.
- [7] Close HVA-203, UV Effluent to T-203.
- [8] Connect a garden hose to one of the following, depending on the chamber to be opened:

[A] V-107, UV #1 Drain

[B] V-109, UV #2 Drain

- [9] Place the discharge end of the garden hose in the sump pit in Building 891.

- [10] Open V-107 or V-109 to drain the chamber to be opened.

- [11] Request a Lockout/Tagout of the following UV/H₂O₂ unit breakers:

- UCP-2UV-PEROX TREATMENT UNIT
- DISC UCP-22 MCC891/4D PDP UCP-22
- DISC UCP 2-1 MCC891/4D PDP UCP 2-1

[A] Document Lockout/Tagout on the Daily Log.

8. INSTRUCTIONS—QUARTZ TUBE CLEANING (continued)

Operator (continued)

[12] Allow the chamber to drain completely.

Draining takes approximately 1 1/2 hours.

[13] **IF** the HNu meter indicates organic levels above background in steps [13] through [26],
THEN:

[A] Immediately discontinue the operation.

[B] Leave the work area.

[C] Notify the Project Manager.

NOTE *Appendix 2, Form FO.8B shows a sample of U.S. Department of Energy Rocky Flats Plant Form FO.8B, Verification of Organic Vapor Monitoring Results (Form FO.8B).*

[14] Don proper PPE in accordance with the requirements of the Health and Safety Plan.

[15] Remove the top row of access plates, and monitor for organic vapors using HNu meter.

[A] Record results on Form FO.8B

[16] Remove the middle row of access plates and monitor for organic vapors using HNu meter.

[A] Record results on Form FO.8B.

[17] Remove the bottom row of plates and monitor for organic vapors using HNu meter.

[A] Record results on Form FO.8B

[18] Spray down the quartz tubes inside the chamber using the garden hose connected to the plant domestic water supply.

[A] Allow the rinse water to drain through V-107 or V-109 to the sump pit.

[19] Using a nonscratching scrub pad, clean the deposits off the quartz tubes and off the interior surfaces of the chamber beginning with the top section and working down.

8. INSTRUCTIONS—QUARTZ TUBE CLEANING (continued)

Operator (continued)

- [20] Rinse the chamber from top to bottom with plant domestic water, and verify that all of the deposits have been removed when the entire chamber and all of the quartz tubes have been cleaned.
- [21] Repeat Steps [18] through [20] until adequate cleaning is completed.
- [22] **WHEN** the first chamber is adequately cleaned,
THEN repeat Steps [8] through [20] to clean the other chamber, as necessary.
- [23] **WHEN** both chambers are adequately cleaned,
THEN:
 - [A] Inspect gaskets for wear or deterioration and replace as necessary.
 - [B] Install the plates over the access ports.
 - [C] Ensure that the gaskets are properly placed, and the plates are secure.
 - [D] Close V-107 and V-109.
- [24] Disconnect the garden hose, and properly store the garden hose.
- [25] Request removal of Lockout/Tagout.
- [26] Close Breakers PDP UCP 2-2 PWR DISTRIB PNL (UV-PC-2) and PDP UCP 2-1 PWR DISTRIB PNL (UV-PC-1).
- [27] **WHEN** the UV/H₂O₂ Unit is placed back in service,
THEN inspect the plates for leakage.
- [28] **IF** a leak is detected,
THEN tighten the bolts for the plate until the leak is stopped.

9. RECORDS

Management of all records is consistent with 1-77000-RM-001, Records Management Guidance for Records Sources.

Project Manager

- [1] Ensure that the original and one copy of the Daily Log are transmitted to the ERPD Project File Center in accordance with 2-G18-ER-ADM-17.01, Records Capture and transmittal.

9. Records (continued)

Submission of record copies to the ERPD File Center satisfies Administrative Record requirements as defined in 3-21000-ADM-17.02, Administrative Records Screening and Processing.

There are no nonquality records generated by this procedure.

10. REFERENCES

Rocky Flats Plant Operable Unit 1 Groundwater Treatment Facility Health and Safety Plan

1-77000-RM-001, Records Management Guidance for Records Sources

2-11000-ER-ADM-02.01, Training

2-G18-ER-ADM-17.01, Records Capture and Transmittal

3-21000-ADM-17.02, Administrative Records Screening and Processing.

5-21000-FO.15, Use of Photoionization Detectors and Flame Ionization Detectors

APPENDIX 1

Page 1 of 6

VALVES

VALVE NO.	DESCRIPTION	TYPE
V-1	P-1 Service Inlet	2-in. Ball
V-2	P-1 Service Outlet	2-in. Ball
V-3	Bag Filter Outlet	2-in. Ball
V-4	IX-1 Inlet Isolation	1 1/2-in. Ball
V-5	IX-1 Outlet Isolation	1 1/2-in. Ball
V-6	IX-2 Inlet Isolation	1 1/2-in. Ball
V-7	IX-2 Outlet Isolation	1 1/2-in. Ball
V-8	Degasifier Inlet Isolation	1 1/2-in. Ball
V-9	Degasifier Outlet/P-2 Inlet	1 1/2-in. Ball
V-10	P-2 Outlet	1 1/2-in. Ball
V-11	IX-3 Inlet Isolation	1 1/2-in. Ball
V-12	IX-3 Outlet Isolation	1 1/2-in. Ball
V-13	IX-4 Inlet Isolation	1 1/2-in. Ball
V-14	UV #2 Sample Port	1/2-in. Ball
V-15	P-3 Inlet	2-in. Ball
V-16	P-3 Outlet	3-in. Ball
V-17	IX-2 Subsurface Backwash Inlet	2-in. Ball
V-18	IX-1 Subsurface Backwash Inlet	2-in. Ball
V-19	IX-3 Subsurface Backwash Inlet	2-in. Ball
V-20	IX-4 Subsurface Backwash Inlet	2-in. Ball
V-21	Bag Filter #2 Inlet	2-in. Ball
V-22	Bag Filter #2 Outlet	2-in. Ball
V-23	Caustic Makeup Water	1-in. Ball
V-24	Acid Makeup Water	1-in. Ball
V-25	P-5 to T-210 Influent	1 1/2-in. Ball
V-26	P-4 to T-210 Influent	1 1/2-in. Ball
V-27	P-5 Service Outlet	3/4-in. Ball
V-28	P-4 Service Outlet	3/4-in. Ball
V-29	P-5 Service Inlet	3/4-in. Ball
V-30	P-4 Service Inlet	1-in. Ball
V-31	T-208 Outlet	3/4-in. Ball
V-32	T-209 Outlet	1-in. Ball
V-33	BLR-2 Outlet	1 1/2-in. Ball
V-34	Degasifier Drain	1-in. Ball
V-35	Bag Filter 2 Drain	1/2-in. Ball

APPENDIX 1

Page 2 of 6

VALVE NO.	DESCRIPTION	TYPE
V-36	Bag Filter 1 Drain	1/2-in. Ball
V-37	P-5 Caustic Sample Port	1/4-in. Ball
V-38	P-4 Acid Sample Port	1/4-in. Ball
V-39	IX-2 Effluent Sample Port	3/4-in. Ball
V-40	IX-1 Effluent Sample Port	3/4-in. Ball
V-41	IX-3 Sample Port	3/4-in. Ball
V-42	IX-4 Sample Port	3/4-in. Ball
V-43	IX-2 Vent	3/4-in. Ball
V-44	IX-1 Vent	3/4-in. Ball
V-45	IX-3 Vent	3/4-in. Ball
V-46	IX-4 Vent	3/4-in. Ball
V-47	IX-2 Acid Regenerant	1 1/2-in. Ball
V-48	IX-3 Acid Regenerant	1 1/2-in. Ball
V-49	IX-4 Caustic Regenerant	1 1/2-in. Ball
V-50	P-100 Outlet	1 1/2-in. Ball
V-51	P-101 Outlet	1-in. Ball
V-52	P-102 Outlet	1-in. Ball
V-53	Collection Gallery Filter Inlet	2-in. Ball
V-54	Collection Gallery Filter Bypass	2-in. Ball
V-55	Collection Gallery Filter Outlet	2-in. Ball
V-56	P-101, P102 Effluent	2-in. Ball
V-57	T-201, T-202 Influent	2-in. Ball
V-58	Domestic Influent Backflow Preventor	2-in. Ball
V-59	Domestic Influent Backflow Preventor	2-in. Ball
V-61	T-201 Secondary Containment Purge	2-in. Ball
V-62	T-202 Secondary Containment Purge	2-in. Ball
V-63	UV Influent T-201, T-202 Secondary Containment Purge	2-in. Ball
V-64	UV Influent T-201 Secondary Containment Purge	2-in. Ball
V-65	Caustic Dilution Water Flow Control	3/4-in. Gate
V-66	Acid Dilution Water Flow Control	3/4-in. Gate
V-67	Caustic Pressure	2-in. Ball
V-68	Acid Pressure	2-in. Ball
V-69	UV Effluent T-203 Secondary Containment Purge	2-in. Ball
V-70	T-204 Secondary Containment Purge	2-in. Ball
V-71	Chemical Metering Isolation	3/4-in. Ball
V-72	Chemical Metering Isolation	3/4-in. Ball
V-73	T-201 and T-202 Secondary Containment Purge	2-in. Ball

APPENDIX 1 Page 3 of 6	DESCRIPTION	TYPE
VALVE NO.		
V-74	UV Effluent Camlock	2-in. Ball
V-75	UV Basket Strainer Influent	2-in. Ball
V-76	Basket Strainer Camlock	2-in. Ball
V-77	P-301, P-302 Effluent Camlock	2-in. Ball
V-78	UV Influent Sample Port	1/2-in. Ball
V-79	UV #1 Effluent Sample Port	1/2-in. Ball
V-80	Gamma Detection Isolation	2-in. Ball
V-81	H ₂ O ₂ Tank Sample Port	1/2-in. Ball
V-82	H ₂ O ₂ Outlet	1/4-in. Ball
V-83	Chemical Metering Isolation	3/4-in. Ball
V-84	H ₂ O ₂ P-1 Influent	1/4-in. Ball
V-85	H ₂ O ₂ P-2 Influent	1/4-in. Ball
V-86	T-209 Influent Line Sample Port	1/4-in. Ball
V-87	T-208 Influent Line Sample Port	1/4-in. Ball
V-88	H ₂ O ₂ P-1 Effluent	1/4-in. Ball
V-89	Air Scour Unloader	1 1/2-in. Butterfly
V-90	H ₂ O ₂ P-2 Effluent	1/4-in. Ball
V-91	H ₂ O ₂ Splitter Pump Influent	1/2-in. Ball
V-92	Splitter Pump Purge	1/2-in. Ball
V-93	UV Chamber #1 Effluent Pressure	1/2-in. Ball
V-94	IX-4 Effluent	1 1/2-in. Ball
V-95	Plant Effluent	2-in. Ball
V-96	Plant Effluent Sample Port	1-in. Ball
V-97	T-210 Purge Port	1/2-in. Ball
V-98	T-210 Sightglass	2-in. Ball
V-99	P-210 Effluent Isolation	2-in. Ball
V-100	P-210 Discharge Isolation	2-in. Ball
V-101	T-210 Effluent Bypass	2-in. Ball
V-102	Influent Secondary Containment Purge	2-in. Ball
V-103	Truck Dock Influent	2-in. Ball
V-104	Truck Dock Influent Secondary Containment Purge	2-in. Ball
V-105	Influent Line Secondary Containment Purge	2-in. Ball
V-106	Effluent Tank Bypass (underground)	N/A
V-107	UV #1 Drain	1/2-in. Ball
V-108	Recirculation Isolation	2-in. Ball
V-109	UV #2 Drain	1/2-in. Ball
V-110	Makeup Water	2-in. Ball

APPENDIX 1

Page 4 of 6

VALVE NO.	DESCRIPTION	TYPE
V-111	Inlet H ₂ O ₂ Rotameter 1	1/2-in. Gate
V-112	Inlet H ₂ O ₂ Rotameter 2	1/2-in. Gate
V-113	Inlet H ₂ O ₂ Rotameter 3	1/2-in. Gate
V-114	Outlet H ₂ O ₂ Rotameter 1	1/2-in. Ball
V-115	Outlet H ₂ O ₂ Rotameter 2	1/2-in. Ball
V-116	Outlet H ₂ O ₂ Rotameter 3	1/2-in. Ball
V-117	T-210 Recirculation Isolation	2-in. Ball
V-118	IX Feed Camlock	2-in. Ball
V-119	PSIG IX-1 Purge	1/4-in. Ball
V-120	PSIG IX-2 Purge	1/4-in. Ball
V-121	PSIG IX-2 Purge (no gauge)	1/4-in. Ball
V-122	PSID IX-2 Purge	1/4-in. Ball
V-123	PSID IX-3 Purge	1/4-in. Ball
V-124	PSIG IX-3 Purge	1/4-in. Ball
V-125	PSIG IX-4 Purge	1/4-in. Ball
V-126	PSIG UV #1	1/2-in. Ball
V-127	PSIG UV #2	1/2-in. Ball
V-128	Gamma Detection Isolation	2-in. Ball
V-129	Recirculation Purge	1-in. Ball
V-130	IX-2 Effluent Isolation	2-in. Ball
V-131	IX-4 Effluent Isolation	2-in. Ball
V-132	T-204 Clean Water Line Sample Port	1/4-in. Sample Cock
HV-107	Sump Pump Discharge	2-in. Ball
HV-108	Sump Pump Discharge	2-in. Ball
HV-500	Recirculation From Effluent Storage Tanks	2-in. Ball
HV-501	Recirculation to UV	2-in. Ball
HV-502	Recirculation to IX	2-in. Ball
HV-503	Recirculation	2-in. Ball
FV-7	Dilute Acid for T-210 Neutralization	1 1/2-in. Auto
FV-9	Acid Regenerant	1 1/2-in. Auto
FV-17	Dilute Caustic for T-210 Neutralization	1 1/2-in. Auto
FV-19	Caustic Regenerant	1 1/2-in. Auto
FV-1A	IX-1 Service Inlet	1 1/2-in. Auto
FV-2A	IX-1 Backwash Inlet	1 1/2-in. Auto
FV-5A	IX-4 Backwash Outlet	1 1/2-in. Auto
FV-8A	IX-1 Fast Rinse Inlet	2-in. Auto

APPENDIX 1

Page 5 of 6

VALVE NO.	DESCRIPTION	TYPE
FV-10A	IX-1 Fast Rinse Outlet	2-in. Auto
FV-11A	IX-1 Air Scour Inlet	1 1/2-in. Auto
FV-12A	IX-1 Subsurface Wash Inlet	1 1/2-in. Auto
FV-13A	IX-1 Air Scour Outlet	1-in. Auto
FV-1B	IX-1 Outlet/IX-2 Service Inlet	1 1/2-in. Auto
FV-2B	IX-2 Backwash Inlet	1 1/2-in. Auto
FV-3B	IX-2 Acid Regenerant/Settler Rinse Inlet	1 1/2-in. Auto
FV-4B	IX-2 Outlet	1 1/2-in. Auto
FV-5B	IX-2 Backwash Outlet	1 1/2-in. Auto
FV-6B	IX-2 Spent Regenerant Outlet	1 1/2-in. Auto
FV-8B	IX-2 Fast Rinse Inlet	2-in. Auto
FV-10B	IX-2 Fast Rinse Outlet	2-in. Auto
FV-11B	IX-2 Air Scour Inlet	1 1/2-in. Auto
FV-12B	IX-2 Subsurface Wash Inlet	1 1/2-in. Auto
FV-13B	IX- Air Scour Outlet	1-in. Auto
FV-1C	IX-2 Service Outlet/IX-3 Service Inlet	1 1/2-in. Auto
FV-2C	IX-3 Backwash Inlet	1 1/2-in. Auto
FV-3C	IX-3 Acid Regenerant/Settler Rinse Inlet	1 1/2-in. Auto
FV-5C	IX-3 Backwash Outlet	1 1/2-in. Auto
FV-6C	IX-3 Spent Regenerant Outlet	1 1/2-in. Auto
FV-8C	IX-3 Fast Rinse Inlet	2-in. Auto
FV-10C	IX-3 Fast Rinse Outlet	2-in. Auto
FV-11C	IX-3 Air Scour Inlet	1 1/2-in. Auto
FV-12C	IX-3 Subsurface Wash Inlet	1 1/2-in. Auto
FV-13C	IX-3 Air Scour Outlet	1-in. Auto
FV-1D	IX-3 Service Outlet/IX-4 Service Inlet	1 1/2-in. Auto
FV-2D	IX-4 Backwash Inlet	1 1/2-in. Auto
FV-3D	IX-4 Caustic Regenerant/Settler Rinse Inlet	1 1/2-in. Auto
FV-4D	IX-4 Service Outlet	1 1/2-in. Auto
FV-5D	IX-4 Backwash Outlet	1 1/2-in. Auto
FV-6D	IX-4 Spent Regenerant Outlet	1 1/2-in. Auto
FV-8D	IX-4 Fast Rinse Inlet	2-in. Auto
FV-10D	IX-4 Fast Rinse Outlet	2-in. Auto
FV-11D	IX-4 Air Scour Inlet	1 1/2-in. Auto
FV-12D	IX-4 Subsurface Wash Inlet	1 1/2-in. Auto

APPENDIX 1

Page 6 of 6

VALVE NO.	DESCRIPTION	TYPE
FV-13D	IX-4 Air Scour Outlet	1-in. Auto
HVA-201	Influent from French Drain to T-201	2-in. Ball
HVB-201	Effluent From T-201	2-in. Ball
HVA-202	Influent from French Drain to T-202	2-in. Ball
HVA-202	Effluent From T-202	2-in. Ball
HVA-203	UV Effluent to T-203	2-in. Ball
HVB-203	IX Feed From T-203	2-in. Ball
HVA-204	Regenerant Effluent to T-204	2-in. Ball
HVB-204	Regeneration Clean Water From RFP	2-in. Ball
HVC-204	Regeneration Clean Water to P-3	2-in. Ball
HVA-205	Plant Effluent/T-205 Influent	2-in. Ball
HVB-205	T-205 Discharge	4-in. Butterfly
HVC-205	T-205 Recirculation	4-in. Butterfly
HVA-206	Plant Effluent/T-206 Influent	2-in. Ball
HVB-206	T-206 Discharge	4-in. Butterfly
HVC-206	T-206 Recirculation	4-in. Butterfly
HVA-207	Plant Effluent/T-207 Influent	2-in. Ball
HVB-207	T-207 Discharge	4-in. Butterfly
HVC-207	T-207 Recirculation	4-in. Butterfly
HVD-207	T-207 Isolation	2-in. Ball
HVA-208	Caustic Inlet-Truck Dock	2-in. Ball
HVB-208	Caustic Outlet-T-208	2-in. Ball
HVA-209	Acid Inlet-Truck Dock	2-in. Ball
HVB-209	Acid Outlet-T-209	2-in. Ball
HVA-210	P-210 Inlet	2-in. Ball
HVB-210	P-210 Outlet	2-in. Ball
HVC-210	Discharge Camlock	2-in. Ball
HVD-210	Discharge Truck Dock	2-in. Ball
HVA-301	P-301 Inlet	2-in. Ball
HVB-301	P-301 Outlet	2-in. Ball
HVA-302	P-302 Inlet	2-in. Ball
HVB-302	P-302 Outlet	2-in. Ball
FCV-1	Fail Close Plant Effluent	1 1/2-in. Solenoid
FCV-2	Fail Close Recycle	2-in. Diaphragm
FCV-3	Collection Gallery Flow Control	2-in. Diaphragm
FCV-4	UV Effluent Control	1 1/2-in. Ball

APPENDIX 2

Page 1 of 1

FORM FO.8B

SAMPLE